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10/568,479	02/15/2006	Kai Eck	DE030296US1	2405
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EXAMINER				
CHANG, JON CARLTON				
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/568,479

Applicant(s)

ECK ET AL.

Examiner

JON CHANG

Art Unit

2624

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 12 May 2009.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-3, 7-10 and 12-21 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-3, 7-10 and 12-21 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 15 February 2006 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____

DETAILED ACTION

Response to Applicant's Amendment and Arguments

1. The amendment filed May 12, 2009, has been entered and made of record. In response to the amendment, the rejection under 35 U.S.C. § 101 is withdrawn.
2. Applicant's arguments, filed May 12, 2009, with respect to the rejection of the claims under 35 U.S.C. § 102 have been fully considered and are persuasive. Therefore, the rejection has been withdrawn. However, upon further consideration, new grounds of rejection are made in view of U.S. Patents 5,285,786 and 6,859,548.
3. The Examiner would like to specifically address Applicant's arguments directed to "a distance image from the map image by a distance transformation" (claims 9 and 12). The Examiner directs Applicant's attention to the portion of Packer cited in the previous Office Action, column 9, lines 52-67 and column 10, lines 1-8. In particular, column 9, lines 56-58 incorporates by reference U.S. Patent 5,568,384. This patent discusses in detail, generating a distance image by using a distance transformation (see abstract, column 2, lines 41-63, and elsewhere). Since Packer states that it utilizes the registration method from U.S. Patent 5,568,384 and incorporates it by reference, the disclosure of Packer is considered to contain the entire disclosure of that patent. Therefore, Packer does disclose the subject matter in question.

Claim Objections

4. Claims 19 is objected to because of the following informalities: claim 19 is drawn to "the method of claim 13", but claim 13 is directed to a "computer readable medium."

5. Appropriate correction is required.

Claim Rejections - 35 USC § 112

6. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

7. Claim 17 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

8. Claim 17 is written as a dependent claim, but does not depend from any claim.

For the purposes of this office action, claim 17 is presumed to depend from claim 1.

9. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

10. Claims 13 and 19 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

11. Claim 13 is now directed to "a computer-readable medium comprising instructions..." There is no support for this limitation in the original disclosure. Claim 19 depends from claim 13.

Claim Rejections - 35 USC § 103

12. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

13. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

14. Claims 1-3, 7-10, 12-21 are rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of U.S. Patent 6,556,695 to Packer et al. (hereinafter referred to as "Packer"), and any one of the following two references: U.S. Patent 5,285,786 to Fujii (hereinafter referred to as "Fujii"), or U.S. Patent 6,859,548 to Yoshioka et al. (hereinafter referred to as "Yoshioka").

15. Regarding Claim 1, Packer discloses a device for combining a current image of an object (Col.8, Lines 47-50 and Col.9 21-24) and a map image of the dwell region of the object (Col.9, Lines 37-52), comprising an imaging means for producing a current

image (fig.1; column 4, line 42 to column 5, line 12), a sensor device for detecting at least one parameter that describes a varying state of the dwell region of the object (column 5, lines 19-36), a data-processing system having a memory for storing a number of map images which are categorized according to a varying state of the dwell region of the object (column 9, lines 42-52), and a monitor for displaying the combination of the current image and the section of the map image (column 10, lines 31-36 and 48-53), wherein the data processing system is arranged

a) to estimate the position of the object in the current image in relation to the map image (Col.9, Lines 59-67 and Col.10, Lines 1-5), and

b) to combine the map image around the estimated position of the object with the current image, the estimated position of the object in the map image being brought into register with the actual position of the object in the current image (Col.10, Lines 31-36).

16. Packer does not disclose using only a section of the map image which just covers the region around the object. However, this is well known in the art.

17. For example, this limitation reads on at least two portions of Fujii. First, Fujii teaches combining images via subtraction, wherein mask image and contrast image data are subtracted (column 7, lines 38-40). As can be seen in Fig.4, if one considers the object to be the contents of image 110, and the map image to be image 100, then the section of the map image 100 just covers the region around the object. Second, Fujii also teaches (column 7, line 63 to column 8, line 15) superimposing two images by using a preset value of brightness where the x-ray image data from a first coexists with blood vessel image data from a second image, effectively using only that section of the

map image (i.e., the blood vessel image data) which just covers the region around the object (i.e., from element 125 in Fig.4). Fujii states that its invention can provide a good grasp of the relative position of a catheter inserted into a blood vessel (column 2, lines 27-40). Therefore, it would have been obvious to one of ordinary skill in the art to modify Packer according to Fujii.

18. As an alternative example, Yoshioka teaches superimposing the picture of a contour region over an original picture (column 18, lines 38-45). This is done by replacing only the pixel values in the portion of the original picture which correspond to the region within the contour region (column 17, lines 46-53). Therefore, only a section of the map image (e.g., original picture) which just covers the region around the object (e.g., the contour region) is used. Yoshioka's invention provides the advantage of lessening the burden to the inspector and obtaining objective, accurate inspection result, and can allow local movement states of the cardiac wall to be easily evaluated (column 2, lines 53-63). Therefore it would have been obvious to one of ordinary skill in the art to modify Packer according to Yoshioka.

19. Regarding Claim 2, Packer discloses the device of claim 1, wherein the object is located in a path network and the map image at least partially reproduces the path network (Col.8, Lines 47-50 and Col.9, Lines 42-44; taking the broadest reasonable interpretation of the claim language, the examiner interprets "path network" to include a vascular system, which the prior art discloses the use of a flexible catheter in a vascular system and corresponding stored images of the vascular system).

20. Regarding Claim 3, Packer discloses the device of claim 1, wherein the map image contains additional information about the structures or functions of the dwell region of the object (Col.9, Lines 42-44; the prior art discloses stored images of the vascular system at successive positions during the cardiac cycle, it is inherent that each of these positions would contain additional information, beyond just a mapping, about the structures and/or functions of the vascular system at the specific heart cycle that make it different from the other cycles).

21. Regarding Claim 7, the device of claim 1, wherein the data-processing system is arranged to select from the memory a map image whose associated state of the dwell region of the object is a best possible match for the state of the dwell region during the current image (Col.9, Lines 59-67 and Col.10, Lines 1-5).

22. Regarding Claim 8, Packer discloses the device of claim 1, wherein the data-processing system is arranged to assign in the map image to each pixel a probability that it belongs to a spatially-defined structure (Col.9, Lines 59-67 and Col.10, Lines 1-5).

23. Regarding Claim 9, Packer discloses the device of claim 1, wherein the data-processing system is arranged to produce a distance image from the map image by a distance transformation (Col.9, Lines 53-67 and Col.10, Lines 1-8; taking the broadest reasonable interpretation of the above claim, the distance image can be interpreted as being a type of function that outputs the likelihood of registration between the map image and the object image. Further, the applicants own specification suggests the distance image is only used for estimating the position of the object in relation to the map image and is never displayed (Page 6, Lines 21-23). This suggests the distance

image does not have to be an actual 'image' but only an estimation tool. Therefore, the prior art anticipates the distance image as claimed herein by calculating a cost function in matching the stored map image to the object image when registering. Note also the incorporation by reference of U.S. Patent 5,568,384 which provides details regarding a distance image by distance transformation).

24. Regarding Claim 10, Packer discloses the device of claim 1, wherein, in the section of the map image being used, points not belonging to a spatially-defined structure are transparent (Col.10, Lines 48-67 and Col.11, Lines 1-13; The prior art discloses different embodiments on how the display is viewed by the physician, including being able to focus on a specific region of the anatomy, therefore it is inherent that the display device in the prior art would allow non-matching points to be transparent in order to better view the targeted portion).

25. Regarding Claim 12, Packer discloses a device for combined portrayal of a current image of an object that is located in a path network (Col.8, Lines 47-50 and Col.9 21-24) and a map image of the path network (Col.9, Lines 37-52), comprising an imaging means for producing a current image (fig.1; column 4, line 42 to column 5, line 12), a sensor device for detecting at least one parameter that describes a varying state of the dwell region of the object (column 5, lines 19-36), a data-processing system having a memory for storing a number of map images which are categorized according to a varying state of the dwell region of the object (column 9, lines 42-52), and a monitor for displaying the combination of the current image and the section of the map

image (column 10, lines 31-36 and 48-53), wherein the data-processing system that is arranged

a) in the map image, to assign to each pixel a probability that it belongs to the path network (Col.9, Lines 59-67 and Col.10, Lines 1-5);

b) to produce a distance image from the map image by a distance transformation (Col.9, Lines 53-67 and Col.10, Lines 1-8; taking the broadest reasonable interpretation of the above claim, the distance image can be interpreted as being a type of function that outputs the likelihood of registration between the map image and the object image. Further, the applicants own specification suggests the distance image is only used for estimating the position of the object in relation to the map image and is never displayed (Page 6, Lines 21-23). This suggests the distance image does not have to be an actual 'image' but only an estimation tool. Therefore, the prior art anticipates the distance image as claimed herein by calculating a cost function in matching the stored map image to the object image when registering. Note also the incorporation by reference of U.S. Patent 5,568,384 which provides details regarding a distance image by distance transformation).

c) by means of the distance image, to estimate the position of the object (8) in relation to the map image of the path network (Col.9, Lines 53-67 and Col.10, Lines 1-8), and

d) to superimpose the map image, wholly or in sections on the current image or a section thereof so that the estimated position of the object in the map image is brought

into register with the actual position of the object in the current image, only a section of the map image is used (Col.10, Lines 31-36).

26. Packer does not disclose using only a section of the map image which just covers the region around the object. However, this is well known in the art.

27. For example, this limitation reads on at least two portions of Fujii. First, Fujii teaches combining images via subtraction, wherein mask image and contrast image data are subtracted (column 7, lines 38-40). As can be seen in Fig.4, if one considers the object to be the contents of image 110, and the map image to be image 100, then the section of the map image 100 just covers the region around the object. Second, Fujii also teaches (column 7, line 63 to column 8, line 15) superimposing two images by using a preset value of brightness where the x-ray image data from a first coexists with blood vessel image data from a second image, effectively using only that section of the map image (i.e., the blood vessel image data) which just covers the region around the object (i.e., from element 125 in Fig.4). Fujii states that its invention can provide a good grasp of the relative position of a catheter inserted into a blood vessel (column 2, lines 27-40). Therefore, it would have been obvious to one of ordinary skill in the art to modify Packer according to Fujii.

28. As an alternative example, Yoshioka teaches superimposing the picture of a contour region over an original picture (column 18, lines 38-45). This is done by replacing only the pixel values in the portion of the original picture which correspond to the region within the contour region (column 17, lines 46-53). Therefore, only a section of the map image (e.g., original picture) which just covers the region around the object

(e.g., the contour region) is used. Yoshioka's invention provides the advantage of lessening the burden to the inspector and obtaining objective, accurate inspection result, and can allow local movement states of the cardiac wall to be easily evaluated (column 2, lines 53-63). Therefore it would have been obvious to one of ordinary skill in the art to modify Packer according to Yoshioka.

29. Regarding claim 13, claim 13 is drawn to a computer-readable medium, and recites a method which generally corresponds to apparatus claim 1, albeit with less detail. Therefore claim 13 is rejected for reasons discussed above with regard to claim 1, for their common elements. Packer discloses a computer-readable medium at column 4, lines 12-15.

30. Regarding Claim 14, Packer discloses the device of claim 1, wherein the varying state is an electrocardiogram or respiratory cycle (Col.9 Lines 5-23).

31. Regarding Claim 15, Packer discloses the device of claim 8, wherein the spatially-defined structure is a path network (Col.9, Lines 59-67 and Col.10, Lines 1-5).

32. Regarding Claim 16, Packer discloses the device of claim 10, wherein the spatially-defined structure is a path network (Col.9, Lines 59-67 and Col.10, Lines 1-5).

33. Regarding Claim 17, packer discloses the device of Claim 1, wherein the imaging means comprise an X-ray apparatus or a magnetic resonance apparatus (Col.10, Lines 31-36 and 48-52).

34. Regarding Claim 18, Packer discloses the device of claim 1, wherein only a section of the current image is used (Col.10, Lines 31-36).

35. Regarding Claim 19, Claim 19 is a method claim corresponding to apparatus Claim 18, therefore the discussion above for Claim 18 is applicable to claim 19.
36. Regarding claim 20, see the discussion above for claims 1 and 13.
37. Regarding claim 21, see the discussion above for claim 2.

Citation of Pertinent Prior Art

38. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

U.S. Patent 20040081269 to Pan et al. teaches a system for registering images using respiratory gating.

U.S. Patent 5,797,843 to Fitch et al. discloses superimposing heart images which are captures using EKG gating.

U.S. Patent 6,370,417 to Horbaschek et al. discloses a method for positioning a catheter in a vessel using image superimposition.

Conclusion

39. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within

TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Contact Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to JON CHANG whose telephone number is (571)272-7417. The examiner can normally be reached on M-F 8:00 a.m.-6:00 p.m..

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Bhavesh Mehta can be reached on (571)272-7453. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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